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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/767,168	Applicant(s) NAKAYA ET AL.	
	Examiner Marcus T. Riley	Art Unit 2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 8/29/07.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16, 19, 20 and 24 is/are rejected.
- 7) ☒ Claim(s) 17, 18, 21-23 and 25 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>attached</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. This office action is responsive to the applicant's remarks received on September 06, 2007. Claims 1-13 remain pending and newly added claims 14-25 are pending.
2. Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

Response to Arguments

3. Applicant's arguments with respect to amended claim 1, filed on September 06, 2007 have been fully considered but they are not persuasive.

Applicant's Remarks

Applicants respectfully submit that Abe and Bromley, alone or in combination, do not disclose, teach, or suggest an imaging head unit wherein the pixel update timings of the imaging heads are alterable in at least the scanning direction for the individual imaging heads. Therefore, Applicants respectfully request the Examiner to withdraw the 35 U.S.C. § 103(a) rejection of claim 1.

Claims 2-7 and 12 are patentable at least by virtue of their dependency on claim 1.

Claim 8 is rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Abe in view of Bromley, and further in view of U.S. Patent No. 5,993,183 to Enomotto et al. ("Enomotto"). For at least the following reasons, Applicants respectfully traverse the rejection.

Claim 8 depends from claim 1. Since Enomotto does not cure the deficient teachings of Abe and Bromley with respect to claim 1, Applicants respectfully submit that claim 8 is patentable at least by virtue of its dependency.

Claim 9 is rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the combination of Abe, Bromley, and Enomotto, and further in view of U.S. Patent No. 6,900,825 to Kito ("Kito"). For at least the following reasons, Applicants respectfully traverse the rejection.

Claim 9 depends from claim 1. Since Kito does not cure the deficient teachings of Abe and Bromley with respect to claim 1, Applicants respectfully submit that claim 9 is patentable at least by virtue of its dependency.

Claim 10 is rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the combination of Abe, Bromley, Enomotto, and Kito and further in view of U.S. Patent No. 6,133,986 to Johnson ("Johnson"). For at least the following reasons, Applicants respectfully traverse the rejection.

Claim 10 depends from claim 1. Since Johnson does not cure the deficient teachings of Abe and Bromley with respect to claim 1, Applicants respectfully submit that claim 10 is patentable at least by virtue of its dependency.

Claim 11 recites an imaging device comprising, inter alia, an imaging head unit including a plurality of imaging heads, and pixel update timings of the imaging heads are alterable in at least the scanning direction for the individual imaging heads. Therefore, Applicants respectfully submit that claim 11 is patentable for at least reasons similar to those given above with respect to claim 1.

Claim 13 recites an imaging method which employs an imaging head unit, the method comprising, inter alia, altering pixel update timings for individual imaging heads. Therefore, Applicants respectfully submit that claim 13 is patentable for at least reasons similar to those given above with respect to claim 1.

Further, Applicants note that the Examiner incorrectly alleges on page 7 of the Office Action that Bromley discloses all the features of claim 13, although portions of Abe (col. 4, lines 18-24) are cited in the rejection. Applicants respectfully request the Examiner to clarify his position regarding the rejection of claim 13.

Examiner's Answer

Examiner submits that Abe et al. (US 5,072,304 hereinafter Abe '304) in combination with Kanatake et al. (US 2002/0092993 A1, hereinafter Kanatake '993), alone or in combination, does disclose, teach, or suggest an imaging head unit wherein the pixel update timings of the imaging heads are alterable in at least the scanning direction for the individual imaging heads.

Abe '304 discloses an imaging head unit comprising a plurality of imaging heads arranged along a direction intersecting a predetermined scanning direction, (*"In addition to the*

rails 2, 2' for main scanning B being secured to the carriage 9', a detecting portion 14 at the position of subscanning D is mounted on the carriage 9'. The detecting portion 14 comprises on a group of photoelectric conversion elements such as linear CCDs of a plurality of bits image forming means such as a lens array for projecting..." column 4, lines 18-24); the imaging heads moving relative to a respective imaging surface in the scanning direction along the imaging surface ("...an image input portion 100 is adapted to read a color document by means of an image reading element 103 and to input image data 104 to a control portion 300. The image input portion 100 has a main scanning drive motor 101 for driving the image reading element 103 in the main scanning direction over the color document, a subscanning drive motor 102, and the like." column 2, lines 65-68 thru column 3, lines 1-4).

Kanatake '993 discloses where pixel update timings of the imaging heads are alterable in at least the scanning direction for the individual imaging heads (*"To achieve this horizontal scaling, the method 300 begins with calculating the site of the focal point 230 in step 302 and an original angle of rotation .theta..sub.OS of the pixel panel 38 relative to the subject 42 in step 304. The site of the focal point 230 is calculated in step 306 and a new angle of rotation .theta..sub.NS of the pixel panel 38 relative to the subject 42 is calculated in step 308. The angle .theta..sub.NS defines the angle to which the pixel panel should be rotated in order to align the pixel element with the focal point 242, which is horizontally aligned with the focal point 234. The pixel panel 38 is then rotated in step 310 to coincide with the angle .theta..sub.NS, which aligns the pixel element with the rotated focal point 242. To vertically align the pixel element with focal point 234, the scan rate of the pixel panel 38 relative to the subject 42 may be altered in step 312."* page 6, paragraph 0086).

Claims 2-7 and 12 are not patentable at least by virtue of their dependency on claim 1.

Regarding claim 2; Kanatake '993 discloses a plurality of imaging elements and the alteration of a pixel update timing is implemented by altering an imaging timing by a duration which is determined by a ratio between a spacing error of an imaging element in the scanning direction and a scanning speed (*"To achieve this horizontal scaling, the method 300 begins with calculating the site of the focal point 230 in step 302 and an original angle of rotation θ_{OS} of the pixel panel 38 relative to the subject 42 in step 304. The site of the focal point 230 is calculated in step 306 and a new angle of rotation θ_{NS} of the pixel panel 38 relative to the subject 42 is calculated in step 308. The angle θ_{NS} defines the angle to which the pixel panel should be rotated in order to align the pixel element with the focal point 242, which is horizontally aligned with the focal point 234. The pixel panel 38 is then rotated in step 310 to coincide with the angle θ_{NS} , which aligns the pixel element with the rotated focal point 242. To vertically align the pixel element with focal point 234, the scan rate of the pixel panel 38 relative to the subject 42 may be altered in step 312."* page 6, paragraph 0086).

Regarding claim 3; Kanatake '993 discloses the alteration of the imaging timing is implemented by retarding the imaging timing (*"A first scan rate is determined, and an original focal point of the pixel element on the subject is determined. A scaled focal point is calculated for the pixel element on the subject, where the scaled focal point includes a first coordinate in a first dimension and a second coordinate in a second dimension. The pixel panel is rotated relative to the subject to position the pixel element at the first coordinate in rotated relative to the subject to position the pixel element at the first coordinate in the first dimension of the scaled focal point, and the first scan rate is altered to a second scan rate to position the pixel element at*

the second coordinate in the second dimension of the scaled focal point.” page 1, paragraph 0007).

Regarding claim 8, claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Abe ‘304 and Kanatake ‘993, as applied to claim 1, and further in view of Enomotto et al. (US 5,933,183 hereinafter Enomotto ‘183). Since claim 8 depends from claim 1, Abe ‘304 and Kanatake ‘993, Examiner respectfully submits that claim 8 is not patentable at least by virtue of its dependency.

Regarding claim 9; claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Abe ‘304, Kanatake ‘993 and Enomotto ‘183, as applied to claim 1, and further in view of Kito (US 6,900,825 B2, hereinafter Kito ‘825). Since claim 9 depends from claim 8 with respect to claim 1 Abe ‘304 and Kanatake ‘993, Examiner respectfully submits that claim 9 is not patentable at least by virtue of its dependency.

Regarding claim 10; claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Abe ‘304, Kanatake ‘993, Enomotto ‘183 and Kito ‘825 as applied to claim 1, and further in view of Johnson (US 6,133,986, hereinafter Johnson ‘986). Since claim 10 depends from claim 9 with respect to claims 8 and claim 1 Abe ‘304 and Kanatake ‘993, Examiner respectfully submits that claim 10 is not patentable at least by virtue of its dependency.

Regarding claim 11; Abe ‘304 and Kanatake ‘993 discloses an imaging device comprising, inter alia, an imaging head unit including a plurality of imaging heads, and pixel update timings of the imaging heads are alterable in at least the scanning direction for the individual imaging heads. Examiner respectfully submits that claim 11 is not patentable with respect to claim 1.

Abe '304 discloses an imaging head unit including a plurality of imaging heads arranged along a direction intersecting a predetermined scanning direction, (*"In addition to the rails 2, 2' for main scanning B being secured to the carriage 9', a detecting portion 14 at the position of subscanning D is mounted on the carriage 9'. The detecting portion 14 comprises on a group of photoelectric conversion elements such as linear CCDs of a plurality of bits image forming means such as a lens array for projecting..."* column 4, lines 18-24); the imaging heads moving relative to a respective imaging surface in the scanning direction along the imaging surface (*"...an image input portion 100 is adapted to read a color document by means of an image reading element 103 and to input image data 104 to a control portion 300. The image input portion 100 has a main scanning drive motor 101 for driving the image reading element 103 in the main scanning direction over the color document, a subscanning drive motor 102, and the like."* column 2, lines 65-68 thru column 3, lines 1-4); a movement apparatus which relatively moves the imaging head unit in the predetermined scanning direction (*"...an image input portion 100 is adapted to read a color document by means of an image reading element 103 and to input image data 104 to a control portion 300. The image input portion 100 has a main scanning drive motor 101 for driving the image reading element 103 in the main scanning direction over the color document, a subscanning drive motor 102, and the like."* column 2, lines 65-68 thru column 3, lines 1-4).

Kanatake '993 discloses where pixel update timings of the imaging heads are alterable in at least the scanning direction for the individual imaging heads (*"To achieve this horizontal scaling, the method 300 begins with calculating the site of the focal point 230 in step 302 and an original angle of rotation .theta..sub.OS of the pixel panel 38 relative to the subject 42 in step*

304. The site of the focal point 230 is calculated in step 306 and a new angle of rotation θ_{NS} of the pixel panel 38 relative to the subject 42 is calculated in step 308. The angle θ_{NS} defines the angle to which the pixel panel should be rotated in order to align the pixel element with the focal point 242, which is horizontally aligned with the focal point 234. The pixel panel 38 is then rotated in step 310 to coincide with the angle θ_{NS} , which aligns the pixel element with the rotated focal point 242. To vertically align the pixel element with focal point 234, the scan rate of the pixel pan.

Regarding claim 13; Abe '304 and Kanatake '993 discloses an imaging method which employs an imaging head unit, the method comprising, inter alia, altering pixel update timings for individual imaging heads. Examiner respectfully submits that claim 13 is not patentable with respect to claim 1.

Abe '304 discloses an imaging method which employs an imaging head unit, the method comprising: relatively moving an imaging unit, which includes the imaging head unit, along the imaging surface in a predetermined scanning direction for imaging ("*...an image input portion 100 is adapted to read a color document by means of an image reading element 103 and to input image data 104 to a control portion 300. The image input portion 100 has a main scanning drive motor 101 for driving the image reading element 103 in the main scanning direction over the color document, a subscanning drive motor 102, and the like.*" column 2, lines 65-68 thru column 3, lines 1-4).

Kanatake '993 discloses altering pixel update timings for individual imaging heads in accordance with a scale factor difference, and implementing a conversion of an imaging scale

factor in at least the scanning direction (*"To achieve this horizontal scaling, the method 300 begins with calculating the site of the focal point 230 in step 302 and an original angle of rotation .theta..sub.OS of the pixel panel 38 relative to the subject 42 in step 304. The site of the focal point 230 is calculated in step 306 and a new angle of rotation .theta..sub.NS of the pixel panel 38 relative to the subject 42 is calculated in step 308. The angle .theta..sub.NS defines the angle to which the pixel panel should be rotated in order to align the pixel element with the focal point 242, which is horizontally aligned with the focal point 234. The pixel panel 38 is then rotated in step 310 to coincide with the angle .theta..sub.NS, which aligns the pixel element with the rotated focal point 242. To vertically align the pixel element with focal point 234, the scan rate of the pixel panel 38 relative to the subject 42 may be altered in step 312."* page 6, paragraph 0086).

Claim Objections

(The previous claim objections are withdrawn in light of the applicant's amendments.)

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art

to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. **Claims 1, 5, 7, 11, 12 & 13** are rejected under 35 U.S.C. 103(a) as being unpatentable over Abe et al. (US 5,072,304 hereinafter Abe '304) in combination with Kanatake et al. (US 2002/0092993 A1, hereinafter Kanatake '993).

Regarding claim 1; Abe '304 discloses an imaging head unit comprising a plurality of imaging heads arranged along a direction intersecting a predetermined scanning direction, (*"In addition to the rails 2, 2' for main scanning B being secured to the carriage 9', a detecting portion 14 at the position of subscanning D is mounted on the carriage 9'. The detecting portion 14 comprises on a group of photoelectric conversion elements such as linear CCDs of a plurality of bits image forming means such as a lens array for projecting..."* column 4, lines 18-24); the imaging heads moving relative to a respective imaging surface in the scanning direction along the imaging surface (*"...an image input portion 100 is adapted to read a color document by means of an image reading element 103 and to input image data 104 to a control portion 300. The image input portion 100 has a main scanning drive motor 101 for driving the image reading element 103 in the main scanning direction over the color document, a subscanning drive motor 102, and the like."* column 2, lines 65-68 thru column 3, lines 1-4).

Abe '304 does not expressly disclose where pixel update timings of the imaging heads are alterable in at least the scanning direction for the individual imaging heads.

Kanatake '993 discloses where pixel update timings of the imaging heads are alterable in at least the scanning direction for the individual imaging heads (*"To achieve this horizontal*

scaling, the method 300 begins with calculating the site of the focal point 230 in step 302 and an original angle of rotation .theta..sub.OS of the pixel panel 38 relative to the subject 42 in step 304. The site of the focal point 230 is calculated in step 306 and a new angle of rotation .theta..sub.NS of the pixel panel 38 relative to the subject 42 is calculated in step 308. The angle .theta..sub.NS defines the angle to which the pixel panel should be rotated in order to align the pixel element with the focal point 242, which is horizontally aligned with the focal point 234. The pixel panel 38 is then rotated in step 310 to coincide with the angle .theta..sub.NS, which aligns the pixel element with the rotated focal point 242. To vertically align the pixel element with focal point 234, the scan rate of the pixel panel 38 relative to the subject 42 may be altered in step 312.” page 6, paragraph 0086).

Abe ‘304 and Kanatake ‘993 are combinable because they are from same field of endeavor of image systems (“*In this manner, a pixel image is projected onto the resist coating 46 of the subject 42.*” Kanatake ‘993 at page 2, paragraph 0026).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the image system as taught by Abe ‘304 by adding where pixel update timings of the imaging heads are alterable in at least the scanning direction for the individual imaging heads as taught by Kanatake ‘993.

The motivation for doing so would have been because it is desirable to accommodate a desired change in the scale of the in images being exposed (“*For one, it is desirable to accommodate a desired change in the scale of the in images being exposed.*” Kanatake ‘993 at page 2, paragraph 0026).

Therefore, it would have been obvious to combine Abe '304 with Kanatake '993 to obtain the invention as specified in claim 1.

Regarding claim 5; Abe '304 discloses a plurality of imaging elements which are two-dimensionally arranged in a plane which is substantially parallel to the imaging surface, and the imaging head is rotatable about a line perpendicular to the imaging surface (*"The reading head 1 is secured to a driving force transmitting portion 6, such as a wire, for main scanning (directions B and E). The driving force transmitting portion 6 for main scanning is trained between pulleys 7, 7' and is moved by means of the rotation of a pulse motor 8. As the pulse motor 8 rotates in the direction of the arrow A, the reading head 1, while moving in the direction of the arrow B, reads the line information of the document S, which is perpendicular to the main scanning direction B, by means of a number of bits corresponding to a group of photoelectric conversion elements."* column 3, lines 45-55).

Regarding claim 7; Abe '304 discloses a modulated light irradiation apparatus which irradiates light, which is modulated at each of pixels in accordance with image information, at an exposure surface which includes the scanning surface (*"...the reader shown in FIG. 9 lights the exposure lamp 503. The reflected light which has irradiated the document forms an image on the CCD line sensor 506 by means of the lens 505."* column 11, lines 55-58).

Regarding claim 11; Abe '304 discloses an imaging head unit including a plurality of imaging heads arranged along a direction intersecting a predetermined scanning direction, (*"In addition to the rails 2, 2' for main scanning B being secured to the carriage 9', a detecting portion 14 at the position of subscanning D is mounted on the carriage 9'. The detecting portion*

14 comprises on a group of photoelectric conversion elements such as linear CCDs of a plurality of bits image forming means such as a lens array for projecting..." column 4, lines 18-24); the imaging heads moving relative to a respective imaging surface in the scanning direction along the imaging surface ("...an image input portion 100 is adapted to read a color document by means of an image reading element 103 and to input image data 104 to a control portion 300. The image input portion 100 has a main scanning drive motor 101 for driving the image reading element 103 in the main scanning direction over the color document, a subscanning drive motor 102, and the like." column 2, lines 65-68 thru column 3, lines 1-4); a movement apparatus which relatively moves the imaging head unit in the predetermined scanning direction ("...an image input portion 100 is adapted to read a color document by means of an image reading element 103 and to input image data 104 to a control portion 300. The image input portion 100 has a main scanning drive motor 101 for driving the image reading element 103 in the main scanning direction over the color document, a subscanning drive motor 102, and the like." column 2, lines 65-68 thru column 3, lines 1-4).

Abe '304 does not expressly disclose where pixel update timings of the imaging heads are alterable in at least the scanning direction for the individual imaging heads.

Kanatake '993 discloses where pixel update timings of the imaging heads are alterable in at least the scanning direction for the individual imaging heads (*"To achieve this horizontal scaling, the method 300 begins with calculating the site of the focal point 230 in step 302 and an original angle of rotation .theta..sub.OS of the pixel panel 38 relative to the subject 42 in step 304. The site of the focal point 230 is calculated in step 306 and a new angle of rotation .theta..sub.NS of the pixel panel 38 relative to the subject 42 is calculated in step 308. The angle*

.theta..sub.NS defines the angle to which the pixel panel should be rotated in order to align the pixel element with the focal point 242, which is horizontally aligned with the focal point 234. The pixel panel 38 is then rotated in step 310 to coincide with the angle .theta..sub.NS, which aligns the pixel element with the rotated focal point 242. To vertically align the pixel element with focal point 234, the scan rate of the pixel panel 38 relative to the subject 42 may be altered in step 312.” page 6, paragraph 0086).

Abe ‘304 and Kanatake ‘993 are combinable because they are from same field of endeavor of image systems (*“In this manner, a pixel image is projected onto the resist coating 46 of the subject 42.”* Kanatake ‘993 at page 2, paragraph 0026).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the image system as taught by Abe ‘304 by adding where pixel update timings of the imaging heads are alterable in at least the scanning direction for the individual imaging heads as taught by Kanatake ‘993.

The motivation for doing so would have been because it is desirable to accommodate a desired change in the scale of the in images being exposed (*“For one, it is desirable to accommodate a desired change in the scale of the in images being exposed.”* Kanatake ‘993 at page 2, paragraph 0026).

Therefore, it would have been obvious to combine Abe ‘304 with Kanatake ‘993 to obtain the invention as specified in claim 11.

Regarding claim 12; Abe ‘304 discloses relatively moving an imaging unit, which includes the imaging head unit, along the imaging surface in the predetermined scanning direction for imaging (*“...an image input portion 100 is adapted to read a color document by*

means of an image reading element 103 and to input image data 104 to a control portion 300. The image input portion 100 has a main scanning drive motor 101 for driving the image reading element 103 in the main scanning direction over the color document, a subscanning drive motor 102, and the like." column 2, lines 65-68 thru column 3, lines 1-4).

Abe '304 does not expressly disclose altering pixel update timings for the individual imaging heads in accordance with a scale factor difference, and implementing a conversion of an imaging scale factor in at least the scanning direction.

Kanatake '993 discloses altering pixel update timings for the individual imaging heads in accordance with a scale factor difference, and implementing a conversion of an imaging scale factor in at least the scanning direction (*"To achieve this horizontal scaling, the method 300 begins with calculating the site of the focal point 230 in step 302 and an original angle of rotation .theta..sub.OS of the pixel panel 38 relative to the subject 42 in step 304. The site of the focal point 230 is calculated in step 306 and a new angle of rotation .theta..sub.NS of the pixel panel 38 relative to the subject 42 is calculated in step 308. The angle .theta..sub.NS defines the angle to which the pixel panel should be rotated in order to align the pixel element with the focal point 242, which is horizontally aligned with the focal point 234. The pixel panel 38 is then rotated in step 310 to coincide with the angle .theta..sub.NS, which aligns the pixel element with the rotated focal point 242. To vertically align the pixel element with focal point 234, the scan rate of the pixel panel 38 relative to the subject 42 may be altered in step 312."* page 6, paragraph 0086).

Abe '304 and Kanatake '993 are combinable because they are from same field of endeavor of image systems (*"In this manner, a pixel image is projected onto the resist coating 46 of the subject 42."* Kanatake '993 at page 2, paragraph 0026).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the image system as taught by Abe '304 by adding where pixel update timings of the imaging heads are alterable in at least the scanning direction for the individual imaging heads as taught by Kanatake '993.

The motivation for doing so would have been because it is desirable to accommodate a desired change in the scale of the in images being exposed (*"For one, it is desirable to accommodate a desired change in the scale of the in images being exposed."* Kanatake '993 at page 2, paragraph 0026).

Therefore, it would have been obvious to combine Abe '304 with Kanatake '993 to obtain the invention as specified in claim 1.

Regarding claim 13; Abe '304 discloses an imaging method which employs an imaging head unit, the method comprising: relatively moving an imaging unit, which includes the imaging head unit, along the imaging surface in a predetermined scanning direction for imaging (*"...an image input portion 100 is adapted to read a color document by means of an image reading element 103 and to input image data 104 to a control portion 300. The image input portion 100 has a main scanning drive motor 101 for driving the image reading element 103 in the main scanning direction over the color document, a subscanning drive motor 102, and the like."* column 2, lines 65-68 thru column 3, lines 1-4).

Abe '304 does not expressly disclose altering pixel update timings for individual imaging heads in accordance with a scale factor difference, and implementing a conversion of an imaging scale factor in at least the scanning direction.

Kanatake '993 discloses altering pixel update timings for individual imaging heads in accordance with a scale factor difference, and implementing a conversion of an imaging scale factor in at least the scanning direction (*"To achieve this horizontal scaling, the method 300 begins with calculating the site of the focal point 230 in step 302 and an original angle of rotation θ_{OS} of the pixel panel 38 relative to the subject 42 in step 304. The site of the focal point 230 is calculated in step 306 and a new angle of rotation θ_{NS} of the pixel panel 38 relative to the subject 42 is calculated in step 308. The angle θ_{NS} defines the angle to which the pixel panel should be rotated in order to align the pixel element with the focal point 242, which is horizontally aligned with the focal point 234. The pixel panel 38 is then rotated in step 310 to coincide with the angle θ_{NS} , which aligns the pixel element with the rotated focal point 242. To vertically align the pixel element with focal point 234, the scan rate of the pixel panel 38 relative to the subject 42 may be altered in step 312."* page 6, paragraph 0086).

Abe '304 and Kanatake '993 are combinable because they are from same field of endeavor of image systems (*"In this manner, a pixel image is projected onto the resist coating 46 of the subject 42."* Kanatake '993 at page 2, paragraph 0026).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the image system as taught by Abe '304 by adding where pixel update timings

of the imaging heads are alterable in at least the scanning direction for the individual imaging heads as taught by Kanatake '993.

The motivation for doing so would have been because it is desirable to accommodate a desired change in the scale of the in images being exposed (*"For one, it is desirable to accommodate a desired change in the scale of the in images being exposed."* Kanatake '993 at page 2, paragraph 0026).

Therefore, it would have been obvious to combine Abe '304 with Kanatake '993 to obtain the invention as specified in claim 13.

6. **Claims 2-4, 6, 14-16, 19, 20 & 24** are rejected under 35 U.S.C. 103(a) as being unpatentable over Abe '304 in combination with Kanatake '993, and further in view of Kanatake '993.

Regarding claim 2; Abe '304 and Kanatake '993 as modified does not expressly disclose a plurality of imaging elements and the alteration of a pixel update timing is implemented by altering an imaging timing by a duration which is determined by a ratio between a spacing error of an imaging element in the scanning direction and a scanning speed.

Kanatake '993 discloses a plurality of imaging elements and the alteration of a pixel update timing is implemented by altering an imaging timing by a duration which is determined by a ratio between a spacing error of an imaging element in the scanning direction and a scanning speed (*"To achieve this horizontal scaling, the method 300 begins with calculating the site of the focal point 230 in step 302 and an original angle of rotation .theta..sub.OS of the pixel panel 38 relative to the subject 42 in step 304. The site of the focal point 230 is calculated in step*

306 and a new angle of rotation .theta..sub.NS of the pixel panel 38 relative to the subject 42 is calculated in step 308. The angle .theta..sub.NS defines the angle to which the pixel panel should be rotated in order to align the pixel element with the focal point 242, which is horizontally aligned with the focal point 234. The pixel panel 38 is then rotated in step 310 to coincide with the angle .theta..sub.NS, which aligns the pixel element with the rotated focal point 242. To vertically align the pixel element with focal point 234, the scan rate of the pixel panel 38 relative to the subject 42 may be altered in step 312.” page 6, paragraph 0086).

Abe ‘304 and Kanatake ‘993 are combinable because they are from same field of endeavor of image systems (*“In this manner, a pixel image is projected onto the resist coating 46 of the subject 42.”* Kanatake ‘993 at page 2, paragraph 0026).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the image system as taught by Abe ‘304 by adding a plurality of imaging elements and the alteration of a pixel update timing is implemented by altering an imaging timing by a duration which is determined by a ratio between a spacing error of an imaging element in the scanning direction and a scanning speed as taught by Kanatake ‘993.

The motivation for doing so would have been because it is desirable to accommodate a desired change in the scale of the in images being exposed (*“For one, it is desirable to accommodate a desired change in the scale of the in images being exposed.”* Kanatake ‘993 at page 2, paragraph 0026).

Therefore, it would have been obvious to combine Abe ‘304 with Kanatake ‘993 to obtain the invention as specified in claim 1.

Regarding claim 3; Kanatake '993 discloses the alteration of the imaging timing is implemented by retarding the imaging timing (*"A first scan rate is determined, and an original focal point of the pixel element on the subject is determined. A scaled focal point is calculated for the pixel element on the subject, where the scaled focal point includes a first coordinate in a first dimension and a second coordinate in a second dimension. The pixel panel is rotated relative to the subject to position the pixel element at the first coordinate in rotated relative to the subject to position the pixel element at the first coordinate in the first dimension of the scaled focal point, and the first scan rate is altered to a second scan rate to position the pixel element at the second coordinate in the second dimension of the scaled focal point."* page 1, paragraph 0007).

Regarding claim 4; Kanatake '993 discloses the alteration of the imaging timing is implemented by advancing the imaging timing (*"To achieve this horizontal scaling, the method 300 begins with calculating the site of the focal point 230 in step 302 and an original angle of rotation θ_{OS} of the pixel panel 38 relative to the subject 42 in step 304. The site of the focal point 230 is calculated in step 306 and a new angle of rotation θ_{NS} of the pixel panel 38 relative to the subject 42 is calculated in step 308. The angle θ_{NS} defines the angle to which the pixel panel should be rotated in order to align the pixel element with the focal point 242, which is horizontally aligned with the focal point 234. The pixel panel 38 is then rotated in step 310 to coincide with the angle θ_{NS} , which aligns the pixel element with the rotated focal point 242. To vertically align the pixel element with focal point 234, the scan rate of the pixel panel 38 relative to the subject 42 may be altered in step 312."* page 6, paragraph 0086).

Regarding claim 6; Kanatake '993 discloses wherein a scanning speed in the scanning direction is alterable (*"To achieve this horizontal scaling, the method 300 begins with calculating the site of the focal point 230 in step 302 and an original angle of rotation .theta..sub.OS of the pixel panel 38 relative to the subject 42 in step 304. The site of the focal point 230 is calculated in step 306 and a new angle of rotation .theta..sub.NS of the pixel panel 38 relative to the subject 42 is calculated in step 308. The angle .theta..sub.NS defines the angle to which the pixel panel should be rotated in order to align the pixel element with the focal point 242, which is horizontally aligned with the focal point 234. The pixel panel 38 is then rotated in step 310 to coincide with the angle .theta..sub.NS, which aligns the pixel element with the rotated focal point 242. To vertically align the pixel element with focal point 234, the scan rate of the pixel panel 38 relative to the subject 42 may be altered in step 312."* page 6, paragraph 0086).

Regarding claim 14; Kanatake '993 discloses where the pixel update timings are timings at which the imaging heads are updated with image data from a memory of the imaging head unit (*"The computer system 36 can keep track of all the data provided to each pixel panel to accommodate the entire scanning procedure."* page 5, paragraph 0073).

Regarding claim 15; Kanatake '993 discloses where the pixel update timings are timings at which the imaging heads are updated with image data from a memory of the imaging head unit (*"The computer system 36 can keep track of all the data provided to each pixel panel to accommodate the entire scanning procedure."* page 5, paragraph 0073).

Regarding claim 16; Kanatake '993 discloses where the pixel update timings are timings at which the imaging heads are updated with image data from a memory of the imaging head unit

("The computer system 36 can keep track of all the data provided to each pixel panel to accommodate the entire scanning procedure." page 5, paragraph 0073); wherein the updated image data is irradiated onto the imaging surface after the imaging heads are updated at an altered pixel update timing ("...light can be projected onto or through the pixel panel to expose the plurality of pixel elements on the subject, and the pixel elements can be moved and altered, according to the pixel -mask pattern, to create contiguous images on the subject." page 1, paragraph 0005).

Regarding claim 19; Kanatake '993 discloses where the imaging head unit includes a plurality of individual heads, and the scale factor difference is determined when the plurality of the individual imaging heads are lined up to form the imaging head unit, and a difference in scaling between the individual imaging heads occurs *("A technical advance is provided by a novel method and system for scaling a pixel element on a subject. In one embodiment, the subject is positioned in a first plane and the method comprises providing a pixel panel to generate the pixel element, where the pixel panel is positioned in a second plane substantially parallel to the first plane. A first scan rate is determined, and an original focal point of the pixel element on the subject is determined. A scaled focal point is calculated for the pixel element on the subject, where the scaled focal point includes a first coordinate in a first dimension and a second coordinate in a second dimension. The pixel panel is rotated relative to the subject to position the pixel element at the first coordinate in rotated relative to the subject to position the pixel element at the first coordinate in the first dimension of the scaled focal point, and the first scan rate is altered to a second scan rate to position the pixel element at the second coordinate in the second dimension of the scaled focal point." page 1, paragraph 0007).*

Regarding claim 20; Kanatake '993 discloses where the implementing the conversion of the imaging scale factor eliminates the scale factor difference (pages 6-7, paragraphs 0079-0095).

Regarding claim 24; Kanatake '993 discloses implementing an alteration of pixel update timing for the plurality of the individual imaging heads simultaneously (*"The component image consists of a plurality of pixel elements, corresponding to a pixel pattern provided to the pixel panel. As a result, light can be projected onto or through the pixel panel to expose the plurality of pixel elements on the subject, and the pixel elements can be moved and altered, according to the pixel -mask pattern, to create contiguous images on the subject."* page 1, paragraph 0005).

7. **Claim 8** is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Abe '304 and Kanatake '993, as applied above to claim 1, and further in view of Enomotto et al. (US 5,933,183 hereinafter Enomotto '183).

Regarding claim 8; The combination of Abe '304 and Kanatake '993 does not expressly disclose a laser device which irradiates laser light; a spatial light modulation element at which numerous imaging element portions, which respectively alter light modulation states in accordance with control signals, are arranged in a two-dimensional arrangement, the spatial light modulation element modulating the laser light irradiated from the laser device; or a control section which controls the imaging element portions by the control signals, which are generated in accordance with the image information.

Enomotto '183 discloses a laser device which irradiates laser light (*"A spatial light modulator has a function of deflecting a propagation direction of incident light, and so it is used, for example+, as an on/off controller of a laser optical system for controlling propagation of a laser beam."* column 1, lines 16-19); a spatial light modulation element at which numerous imaging element portions, which respectively alter light modulation states in accordance with control signals, are arranged in a two-dimensional arrangement, the spatial light modulation element modulating the laser light irradiated from the laser device (*"As shown in FIG. 11, a data write control circuit 72 reads one line image data for each color from the line memory 71. Synchronously with a write timing signal from the controller 71, the data write control circuit 72 sequentially writes as mirror drive data one bit after another, starting from the highest bit of each image data set, into memory cells 7 of the color spatial light modulator 10."* column 7, lines 51-57); 3) a control section which controls the imaging element portions by the control signals, which are generated in accordance with the image information (*"As shown in FIG. 11, a data write control circuit 72 reads one line image data for each color from the line memory 71. Synchronously with a write timing signal from the controller 71, the data write control circuit 72 sequentially writes as mirror drive data one bit after another, starting from the highest bit of each image data set, into memory cells 7 of the color spatial light modulator 10."* column 7, lines 51-57).

Abe '304 and Kanatake '993 are combinable with Enomotto '183 because they are from same field of endeavor of image systems (*"...the invention relates to a color spatial light modulator having small size mirrors disposed in a line or matrix, for each which the light reflection direction is variable for projecting a specific color spot light, and to a color printer*

using such a color spatial light modulator for image formation." Enomotto '183 at column 1, lines 8-13).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the image system as taught by Abe '304 and Kanatake '993 by adding a laser device which irradiates laser light; a spatial light modulation element at which numerous imaging element portions, which respectively alter light modulation states in accordance with control signals, are arranged in a two-dimensional arrangement, the spatial light modulation element modulating the laser light irradiated from the laser device; or a control section which controls the imaging element portions by the control signals, which are generated in accordance with the image information as taught by Enomotto '183.

The motivation for doing so would have been because it advantageous so that the spatial light modulator printer can be capable of dispensing with a rotatable color filter disk (*"It is a principal object of the present invention to provide a color spatial light modulator capable of dispensing with a rotatable color filter disk."* Enomotto '183 at column 2, lines 37-39).

Therefore, it would have been obvious to combine Abe '304 and Kanatake '993 with Enomotto '183 to obtain the invention as specified in claim 1.

8. **Claim 9** is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Abe '304, Kanatake '993 and Enomotto '183 as applied above to claim 8, and further in view of Kito '825.

Regarding claim 9; the combination of Abe '304, Kanatake '993 and Enomotto '183 does not expressly disclose a micromirror device which includes numerous micromirrors arranged in a two-dimensional arrangement, angles of reflection surfaces of which micromirrors are respectively alterable in accordance with the control signals.

Kito '825 discloses a micromirror device which includes numerous micromirrors arranged in a two-dimensional arrangement, angles of reflection surfaces of which micromirrors are respectively alterable in accordance with the control signals (*"A controller controls the spatial light modulator, and according to the image data, sets micromirrors in one first group in the spatial light modulator to the first position, sets micromirrors in a second group in the spatial light modulator to the second position except for the first group, to modulate the light by reflection on the first group, for indication of the simulated image with the indicating projecting optical system, and also according to the image data..."* column 2, lines 60-67).

Abe '304, Kanatake '993 and Enomotto '183 are combinable with Kito '825 because they are from same field of endeavor of image systems (*"In order to achieve the above and other objects and advantages of this invention, a printer includes a pick-up section for picking up a picture image in photo film to output image data."* Kito '825 at column 1, lines 63-66).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the image system as taught by Abe '304, Kanatake '993 and Enomotto '183 by adding a micromirror device which includes numerous micromirrors arranged in a two-dimensional arrangement, angles of reflection surfaces of which micromirrors are respectively alterable in accordance with the control signals as taught by Kito '825.

The motivation for doing so would have been because it advantageous so that the device may have a small size and operate at high speed (*"...the present invention relates to a printer and projector which is equipped with a micromirror device, can have a small size and can operate at high speed."* Kito '825 at column 1, lines 9-12).

Therefore, it would have been obvious to combine Abe '304, Kanatake '993 and Enomotto '183 with Kito '825 to obtain the invention as specified in claim 1.

9. **Claim 10** is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Abe '304, Bromley '610, Enomotto '183 and Kito '825 as applied above to claim 9, and further in view of Johnson (US 6,133,986, hereinafter Johnson '986).

Regarding claim 10; the combination of Abe '304, Kanatake '993, Enomotto '183 and Kito '825 does not expressly disclose a liquid crystal shutter array which includes numerous liquid crystal cells arranged in a two-dimensional arrangement, which are respectively capable of blocking transmitted light in accordance with the control signals.

Johnson '986 discloses a liquid crystal shutter array which includes numerous liquid crystal cells arranged in a two-dimensional arrangement, which are respectively capable of blocking transmitted light in accordance with the control signals [*"With the bi-directional raster scan (FIG. 4) the image surface is divided into an array of square or rectangular cells with cell dimensions matching the microlens center spacing, and the surface is scanned bi-directionally so that each focal point 15 scans a pattern of raster lines covering a single cell 16."* column 5, lines 24 - 29) see also column 17, lines 64-67 thru column 18, lines 1-3, (*"The image*

source could, for example, be a film transparency or a liquid crystal device (LCD). However, reflective media have the advantage that the illumination can be focused down to an array of very small pixel elements by means of an object-plane microlens array in close proximity to the light-modulating elements (as in FIGS. 22 and 23).”].

Abe ‘304, Kanatake ‘993, Enomotto ‘183 and Kito ‘825 are combinable with Johnson ‘986 because they are from same field of endeavor of image systems (*“The invention relates to two fields that can be broadly categorized as “image reading” and “image writing.”* Johnson ‘986 at column 1, lines 12-13).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the image system as taught by Abe ‘304, Kanatake ‘993, Enomotto ‘183 and Kito ‘825 by adding a liquid crystal shutter array which includes numerous liquid crystal cells arranged in a two-dimensional arrangement, which are respectively capable of blocking transmitted light in accordance with the control signals as taught by Johnson ‘986.

The motivation for doing so would have been because it advantageous to provide an image system and technique that would circumvent the tradeoff between image resolution and field size (*“The invention provides imaging systems and techniques that circumvent the tradeoff between image resolution and field size which is the source of much of the complexity and expense of conventional wide-field, high-NA microscopy and microlithography systems.”* Johnson ‘986 at column 2, lines 6-10).

Therefore, it would have been obvious to combine Abe ‘304, Kanatake ‘993, Enomotto ‘183 and Kito ‘825 with Johnson ‘986 to obtain the invention as specified in claim 1.

Allowable Subject Matter


10. **Claims 17, 18, 21-23 and 25** objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

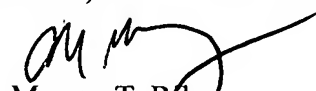
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marcus T. Riley whose telephone number is 571-270-1581. The examiner can normally be reached on Monday - Friday, 7:30-5:00, est.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Twyler L. Haskins can be reached on 571-272-7406. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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